

SEQUENCE LISTING

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<120> Ricin Vaccine and Methods of Making and Using Thereof

<130> P67452US0 (RIID 01-58)

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<170> PatentIn Ver. 2.1

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 <213> Ricinus communis

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 Asp Asn Asn Ile Phe Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr
 35 40 45
 Ala Gly Ala Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg
 50 55 60
 Gly Arg Leu Thr Thr Gly Ala Asp Val Arg His Glu Ile Pro Val Leu
 65 70 75 80
 Pro Asn Arg Val Gly Leu Pro Ile Asn Gln Arg Phe Ile Leu Val Glu
 85 90 95
 Leu Ser Asn His Ala Glu Leu Ser Val Thr Leu Ala Leu Asp Val Thr
 100 105 110
 Asn Ala Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser Ala Tyr Phe Phe
 115 120 125
 His Pro Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr His Leu Phe Thr
 130 135 140
 Asp Val Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn Tyr Asp Arg
 145 150 155 160
 Leu Glu Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu Leu Gly Asn
 165 170 175
 Gly Pro Leu Glu Glu Ala Ile Ser Ala Leu Tyr Tyr Tyr Ser Thr Gly
 180 185 190

Gly Thr Gln Leu Pro Thr Leu Ala Arg Ser Phe Ile Ile Cys Ile Gln
 195 200 205
 Met Ile Ser Glu Ala Ala Arg Phe Gln Tyr Ile Glu Gly Glu Met Arg
 210 215 220
 Thr Arg Ile Arg Tyr Asn Arg Arg Ser Ala Pro Asp Pro Ser Val Ile
 225 230 235 240
 Thr Leu Glu Asn Ser Trp Gly Arg Leu Ser Thr Ala Ile Gln Glu Ser
 245 250 255
 Asn Gln Gly Ala Phe Ala Ser Pro Ile Gln Leu Gln Arg Arg Asn Gly
 260 265 270
 Ser Lys Phe Ser Val Tyr Asp Val Ser Ile Leu Ile Pro Ile Ile Ala
 275 280 285
 Leu Met Val Tyr Arg Cys Ala Pro Pro Pro Ser Ser Gln Phe Ser Leu
 290 295 300
 Leu Ile Arg Pro Val Val Pro Asn Phe Asn Ala Asp Val Cys Met Asp
 305 310 315 320
 Pro Glu Pro Ile Val Arg Ile Val Gly Arg Asn Gly Leu Cys Val Asp
 325 330 335
 Val Arg Asp Gly Arg Phe His Asn Gly Asn Ala Ile Gln Leu Trp Pro
 340 345 350
 Cys Lys Ser Asn Thr Asp Ala Asn Gln Leu Trp Thr Leu Lys Arg Asp
 355 360 365
 Asn Thr Ile Arg Ser Asn Gly Lys Cys Leu Thr Thr Tyr Gly Tyr Ser
 370 375 380
 Pro Gly Val Tyr Val Met Ile Tyr Asp Cys Asn Thr Ala Ala Thr Asp
 385 390 395 400
 Ala Thr Arg Trp Gln Ile Trp Asp Asn Gly Thr Ile Ile Asn Pro Arg
 405 410 415
 Ser Ser Leu Val Leu Ala Ala Thr Ser Gly Asn Ser Gly Thr Thr Leu
 420 425 430
 Thr Val Gln Thr Asn Ile Tyr Ala Val Ser Gln Gly Trp Leu Pro Thr
 435 440 445
 Asn Asn Thr Gln Pro Phe Val Thr Thr Ile Val Gly Leu Tyr Gly Leu
 450 455 460
 Cys Leu Gln Ala Asn Ser Gly Gln Val Trp Ile Glu Asp Cys Ser Ser
 465 470 475 480
 Glu Lys Ala Glu Gln Gln Trp Ala Leu Tyr Ala Asp Gly Ser Ile Arg
 485 490 495
 Pro Gln Gln Asn Arg Asp Asn Cys Leu Thr Ser Asp Ser Asn Ile Arg
 500 505 510
 Glu Thr Val Val Lys Ile Leu Ser Cys Gly Pro Ala Ser Ser Gly Gln

515	520	525
Arg Trp Met Phe Lys Asn Asp Gly Thr Ile Leu Asn Leu Tyr Ser Gly		
530	535	540
Leu Val Leu Asp Val Arg Ala Ser Asp Pro Ser Leu Lys Gln Ile Ile		
545	550	555
Leu Tyr Pro Leu His Gly Asp Pro Asn Gln Ile Trp Leu Pro Leu Phe		
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<400> 2
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Thr Trp Leu Cys Phe Gly Ser Thr Ser Gly Trp Ser Phe Thr Leu Glu
 20 25 30

Asp Asn Asn Ile Phe Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr
 35 40 45

Ala Gly Ala Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg
 50 55 60

Gly Arg Leu Thr Thr Gly Ala Asp Val Arg His Glu Ile Pro Val Leu
 65 70 75 80

Pro Asn Arg Val Gly Leu Pro Ile Asn Gln Arg Phe Ile Leu Val Glu
 85 90 95

Leu Ser Asn His Ala Glu Leu Ser Val Thr Leu Ala Leu Asp Val Thr
 100 105 110

Asn Ala Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser Ala Tyr Phe Phe
 115 120 125

His Pro Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr His Leu Phe Thr
 130 135 140

Asp Val Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn Tyr Asp Arg
 145 150 155 160

Leu Glu Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu Leu Gly Asn
 165 170 175

Gly Pro Leu

<210> 3
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<213> Ricinus communis

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Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg Leu
20 25 30
Thr Thr Gly Ala Asp Val Arg His Glu Ile Pro Val Leu Pro Asn Arg
35 40 45
Val Gly Leu Pro Ile Asn Gln Arg Phe Ile Leu Val Glu Leu Ser Asn
50 55 60
His Ala Glu Leu Ser Val Thr Leu Ala Leu Asp Val Thr Asn Ala Tyr
65 70 75 80
Val Val Gly Tyr Arg Ala Gly Asn Ser Ala Tyr Phe Phe His Pro Asp
85 90 95
Asn Gln Glu Asp Ala Glu Ala Ile Thr His Leu Phe Thr Asp Val Gln
100 105 110
Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn Tyr Asp Arg Leu Glu Gln
115 120 125
Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu Leu Gly Asn Gly Pro Leu
130 135 140
Glu Glu Ala Ile Ser Ala Leu Tyr Tyr Tyr Ser Thr Gly Gly Thr Gln
145 150 155 160
Leu Pro Thr Leu Ala Arg Ser Phe Ile Ile Cys Ile Gln Met Ile Ser
165 170 175
Glu Ala Ala Arg Phe Gln Tyr Ile Glu Gly Glu Met Arg Thr Arg Ile
180 185 190
Arg Tyr Asn Arg Arg Ser
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<212> PRT

<213> Ricinus communis

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Ile Phe Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr Ala Gly Ala
1 5 10 15
Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg Leu
20 25 30
Thr Val Leu Pro Asn Arg Val Gly Leu Pro Ile Asn Gln Arg Phe Ile
35 40 45
Leu Val Glu Leu Ser Asn His Ala Glu Leu Ser Val Thr Leu Ala Leu
50 55 60

Asp Val Thr Asn Ala Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser Ala
 65 70 75 80
 Tyr Phe Phe His Pro Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr His
 85 90 95
 Leu Phe Thr Asp Val Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn
 100 105 110
 Tyr Asp Arg Leu Glu Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu
 115 120 125
 Leu Gly Asn Gly Pro Leu Glu Glu Ala Ile Ser Ala Leu Tyr Tyr Tyr
 130 135 140
 Ser Thr Gly Gly Thr Gln Leu Pro Thr Leu Ala Arg Ser Phe Ile Ile
 145 150 155 160
 Cys Ile Gln Met Ile Ser Glu Ala Ala Arg Phe Gln Tyr Ile Glu Gly
 165 170 175
 Glu Met Arg Thr Arg Ile Arg Tyr Asn Arg Arg Ser
 180 185

 <210> 5
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 <213> Ricinus communis

 <400> 5
 Met Ile Phe Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr Ala Gly
 1 5 10 15
 Ala Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg
 20 25 30
 Leu Thr Thr Gly Ala Asp Val Arg His Glu Ile Pro Val Leu Pro Asn
 35 40 45
 Arg Val Gly Leu Pro Ile Asn Gln Arg Phe Ile Leu Val Glu Leu Ser
 50 55 60
 Asn His Ala Glu Leu Ser Val Thr Leu Ala Leu Asp Val Thr Asn Ala
 65 70 75 80
 Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser Ala Tyr Phe Phe His Pro
 85 90 95
 Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr His Leu Phe Thr Asp Val
 100 105 110
 Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn Tyr Asp Arg Leu Glu
 115 120 125
 Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu Leu Gly Asn Gly Pro
 130 135 140
 Leu Glu Glu Ala Ile Ser Ala Leu Tyr Tyr Tyr Ser Thr Gly Gly Thr
 145 150 155 160

Gln Leu Pro Thr Leu Ala Arg Ser Phe Ile Ile Cys Ile Gln Met Ile
165 170 175

Ser Glu Ala Ala Arg Phe Gln Tyr Ile Glu Gly Glu Met Arg Thr Arg
180 185 190

Ile Arg Tyr Asn Arg Arg Ser
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<210> 6
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<212> PRT
<213> Ricinus communis

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Met Ile Phe Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr Ala Gly
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Ala Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg
20 25 30

Leu Thr Val Leu Pro Asn Arg Val Gly Leu Pro Ile Asn Gln Arg Phe
35 40 45

Ile Leu Val Glu Leu Ser Asn His Ala Glu Leu Ser Val Thr Leu Ala
50 55 60

Leu Asp Val Thr Asn Ala Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser
65 70 75 80

Ala Tyr Phe Phe His Pro Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr
85 90 95

His Leu Phe Thr Asp Val Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly
100 105 110

Asn Tyr Asp Arg Leu Glu Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile
115 120 125

Glu Leu Gly Asn Gly Pro Leu Glu Glu Ala Ile Ser Ala Leu Tyr Tyr
130 135 140

Tyr Ser Thr Gly Gly Thr Gln Leu Pro Thr Leu Ala Arg Ser Phe Ile
145 150 155 160

Ile Cys Ile Gln Met Ile Ser Glu Ala Ala Arg Phe Gln Tyr Ile Glu
165 170 175

Gly Glu Met Arg Thr Arg Ile Arg Tyr Asn Arg Arg Ser
180 185

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Met Val Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr Ala Gly Ala

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 Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg Leu
 20 25 30
 Thr Thr Gly Ala Asp Val Arg His Glu Ile Pro Val Leu Pro Asn Arg
 35 40 45
 Val Gly Leu Pro Ile Asn Gln Arg Phe Ile Leu Val Glu Leu Ser Asn
 50 55 60
 His Ala Glu Leu Ser Val Thr Leu Ala Leu Asp Val Thr Asn Ala Tyr
 65 70 75 80
 Val Val Gly Tyr Arg Ala Gly Asn Ser Ala Tyr Phe Phe His Pro Asp
 85 90 95
 Asn Gln Glu Asp Ala Glu Ala Ile Thr His Leu Phe Thr Asp Val Gln
 100 105 110
 Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn Tyr Asp Arg Leu Glu Gln
 115 120 125
 Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu Leu Gly Asn Gly Pro Leu
 130 135 140
 Glu Glu Ala Ile Ser Ala Leu Tyr Tyr Tyr Ser Thr Gly Gly Thr Gln
 145 150 155 160
 Leu Pro Thr Leu Ala Arg Ser Phe Ile Ile Cys Ile Gln Met Ile Ser
 165 170 175
 Glu Ala Ala Arg Phe Gln Tyr Ile Glu Gly Glu Met Arg Thr Arg Ile
 180 185 190
 Arg Tyr Asn Arg Arg Ser
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<210> 8
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 <213> Ricinus communis

<400> 8
 Met Val Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr Ala Gly Ala
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 Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg Leu
 20 25 30
 Thr Val Leu Pro Asn Arg Val Gly Leu Pro Ile Asn Gln Arg Phe Ile
 35 40 45
 Leu Val Glu Leu Ser Asn His Ala Glu Leu Ser Val Thr Leu Ala Leu
 50 55 60
 Asp Val Thr Asn Ala Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser Ala
 65 70 75 80
 Tyr Phe Phe His Pro Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr His

85 90 95

Leu Phe Thr Asp Val Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn
100 105 110

Tyr Asp Arg Leu Glu Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu
115 120 125

Leu Gly Asn Gly Pro Leu Glu Glu Ala Ile Ser Ala Leu Tyr Tyr Tyr
130 135 140

Ser Thr Gly Gly Thr Gln Leu Pro Thr Leu Ala Arg Ser Phe Ile Ile
145 150 155 160

Cys Ile Gln Met Ile Ser Glu Ala Ala Arg Phe Gln Tyr Ile Glu Gly
165 170 175

Glu Met Arg Thr Arg Ile Arg Tyr Asn Arg Arg Ser
180 185

<210> 9
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<212> PRT
<213> Ricinus communis

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Ile Phe Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr Ala Gly Ala
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Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg Leu
20 25 30

Thr Asn Arg Val Gly Leu Pro Ile Asn Gln Arg Phe Ile Leu Val Glu
35 40 45

Leu Ser Asn His Ala Glu Leu Ser Val Thr Leu Ala Leu Asp Val Thr
50 55 60

Asn Ala Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser Ala Tyr Phe Phe
65 70 75 80

His Pro Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr His Leu Phe Thr
85 90 95

Asp Val Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn Tyr Asp Arg
100 105 110

Leu Glu Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu Leu Gly Asn
115 120 125

Gly Pro Leu Glu Glu Ala Ile Ser Ala Leu Tyr Tyr Tyr Ser Thr Gly
130 135 140

Gly Thr Gln Leu Pro Thr Leu Ala Arg Ser Phe Ile Ile Cys Ile Gln
145 150 155 160

Met Ile Ser Glu Ala Ala Arg Phe Gln Tyr Ile Glu Gly Glu Met Arg
165 170 175

Thr Arg Ile Arg Tyr Asn Arg Arg Ser

<210> 10
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 Ala Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg
 20 25 30
 Leu Thr Thr Gly Ala Asp Val Arg His Glu Ile Pro Val Leu Pro Asn
 35 40 45
 Arg Val Gly Leu Pro Ile Asn Gln Arg Phe Ile Leu Val Glu Leu Ser
 50 55 60
 Asn His Ala Glu Leu Ser Val Thr Leu Ala Leu Asp Val Thr Asn Ala
 65 70 75 80
 Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser Ala Tyr Phe Phe His Pro
 85 90 95
 Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr His Leu Phe Thr Asp Val
 100 105 110
 Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly Asn Tyr Asp Arg Leu Glu
 115 120 125
 Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile Glu Leu Gly Asn Gly Pro
 130 135 140
 Leu Glu Glu Ala Ile Ser Ala Leu Tyr Tyr Tyr Ser Thr Gly Gly Thr
 145 150 155 160
 Gln Leu Pro Thr Leu Ala Arg Ser Phe Ile Ile Cys Ile Gln Met Ile
 165 170 175
 Ser Glu Ala Ala Arg Phe Gln Tyr Ile Glu Gly Glu Met Arg Thr Arg
 180 185 190
 Ile Arg Tyr Asn Arg Arg Ser Ala
 195 200

<210> 11
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 <212> PRT
 <213> Ricinus communis

<400> 11
 Met Ile Phe Pro Lys Gln Tyr Pro Ile Ile Asn Phe Thr Thr Ala Gly
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 Ala Thr Val Gln Ser Tyr Thr Asn Phe Ile Arg Ala Val Arg Gly Arg
 20 25 30

Leu Thr Val Leu Pro Asn Arg Val Gly Leu Pro Ile Asn Gln Arg Phe
 35 40 45
 Ile Leu Val Glu Leu Ser Asn His Ala Glu Leu Ser Val Thr Leu Ala
 50 55 60
 Leu Asp Val Thr Asn Ala Tyr Val Val Gly Tyr Arg Ala Gly Asn Ser
 65 70 75 80
 Ala Tyr Phe Phe His Pro Asp Asn Gln Glu Asp Ala Glu Ala Ile Thr
 85 90 95
 His Leu Phe Thr Asp Val Gln Asn Arg Tyr Thr Phe Ala Phe Gly Gly
 100 105 110
 Asn Tyr Asp Arg Leu Glu Gln Leu Ala Gly Asn Leu Arg Glu Asn Ile
 115 120 125
 Glu Leu Gly Asn Gly Pro Leu Glu Glu Ala Ile Ser Ala Leu Tyr Tyr
 130 135 140
 Tyr Ser Thr Gly Gly Thr Gln Leu Pro Thr Leu Ala Arg Ser Phe Ile
 145 150 155 160
 Ile Cys Ile Gln Met Ile Ser Glu Ala Ala Arg Phe Gln Tyr Ile Glu
 165 170 175
 Gly Glu Met Arg Thr Arg Ile Arg Tyr Asn Arg Arg Ser Ala
 180 185 190

<210> 12

<211> 25

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: RTA198 primer
for Nde I site.

<400> 12

gaattccata tgatcttccc aaagc

25

<210> 13

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: RTA198 primer
for stop codon and Sal I site.

<400> 13

gtcgacctag gatctacggt tgtatctaat tc

32

<210> 14

<211> 40

<212> DNA

<213> Artificial Sequence

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<400> 14
ctgtcagagg tagattgact gtcttgcta acagagttgg
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40

<210> 15

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Antisense PCR oligonucleotide sequence

<400> 15

ccaactctgt taggcaagac agtcaatcta cctctgacag